

PATENT SPECIFICATION

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- (21) Application No. 43838/74 (22) Filed 9 Oct. 1974
(31) Convention Application No. 2 351 340 (32) Filed 12 Oct. 1973 in
(33) Germany (DT)
(44) Complete Specification published 11 Aug. 1976
(51) INT. CL.² H01F 5/06
(52) Index at acceptance
HIT 15 1C 7C1A 7C1B1 7C1B2 7C3 8 9



(54) IMPROVEMENTS IN OR RELATING TO RIBBON COILS FOR TRANSFORMERS

(71) We, SIEMENS AKTIENGESELLSCHAFT, a German Company, of Berlin and Munich, Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to ribbon coils for transformers, and particularly for high voltage transformers, the turns of which are electrically insulated from one another by means of an electrically insulating ribbon.

Coils of this type have long been known and are used mainly because of their good exploitation of the winding space, their relatively high short-circuiting resistance and the greater electrical load capacity of foils or ribbons compared with wires. Heretofore, however, the ribbon winding technique has been considered to be less suitable for high-voltage transformers of compact construction as none of the previously employed winding techniques or material processing techniques can prevent inclusions of air between the conductor ribbon and the insulating layer so that there is a danger of the occurrence of harmful corona discharges.

If it is desired to reduce the discharge danger at the high voltages prevailing between adjacent turns of the conductor ribbon, it is of course possible to reduce the field strengths at the ribbon surface by thickening the insulating layers. However, such a measure is unsatisfactory since preference is given to the use of ribbon windings mainly on account of their space-saving high-filling factor and their high-current load capacity.

It has already been proposed to produce a coil of this type by winding together a ribbon-shaped metal foil and an insulating ribbon metallised on both sides, and a coil of this known type is shown schematically

and partly in section in the drawing.

The coil illustrated comprises a ribbon-shaped metal foil 1, consisting, for example, of copper or aluminium, and a ribbon-shaped insulating foil 3 which is provided on both sides with a metallisation 2. The metallisation 2 is vapour-deposited onto the insulating foil 3 and can also consist of copper. The insulating foil 3 can be made of conventional insulating paper or a synthetic plastics foil which, as is known, needs a smaller thickness than does paper to obtain the same insulating values. The terminations of the winding are shown schematically as supply lines 4, 5. A protective insulating casing 6 surrounds the entire coil arrangement.

In the arrangement illustrated, instead of attempting to perfect winding or processing techniques which could prevent the undesired inclusions of air, the inclusions of air are actually permitted. These inclusions are however, in accordance with the invention, not located between the ribbon conductor and the metallisation of insulating layers but between the metallisations of two insulating layers. The junction between the metallisation and the insulating layer on the other hand is maintained entirely free of air by means of the metallisation technique. The danger of corona discharges is therefore counteracted in an extremely simple fashion, by shifting the air inclusions into the interior of the conductor structure where as is known no potential differences prevail and where therefore the included air is not subjected to electrical stress.

An object of the invention is to provide an improved ribbon winding which, while ensuring a particularly good exploitation of the winding space, nevertheless remains corona-resistant, and is simple to manufacture.

The invention consists of a ribbon coil

the turns of which are formed only by the metallisations of an electrically insulating ribbon metallised on both sides, the turns being electrically insulated from one another by the insulating ribbon.

5 Since the ribbon coil is constituted solely by the double-sided metallisation of the insulating ribbon, the conduction properties thereof must of course satisfy all the requirements, and in particular the metallisation cross-section must be adequate for the current to be conducted: Such a construction has the advantage, however, of enabling particularly simple winding methods to be used as there is no necessity for the simultaneous winding of strips having different degrees of stability, width and flexibility.

10 The invention is particularly advantageous for use in the current supply

systems of power electron-discharge tubes, in particular travelling-wave tubes in communications satellites, where high-voltage transformers are required which have the smallest possible space requirement but nevertheless are extremely reliable.

WHAT WE CLAIM IS:—

1. A ribbon coil the turns of which are formed only by the metallisations of an electrically insulating ribbon metallised on both sides, the turns being electrically insulated from one another by the insulating ribbon.

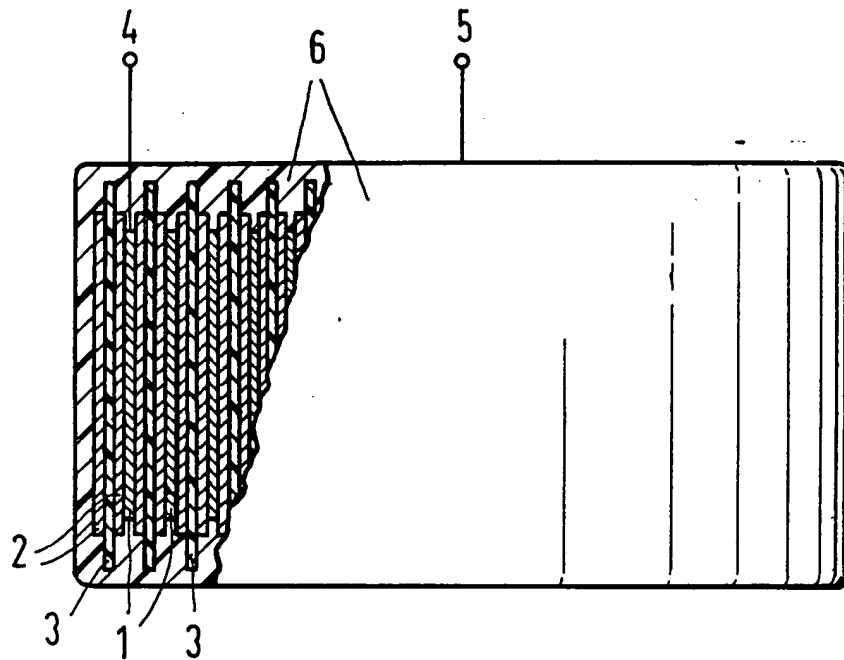
For the Applicants,
G. F. REDFERN & CO.,
St. Martin's House,
177 Preston Road,
Brighton — Sussex.

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COMPLETE SPECIFICATION

1 SHEETS

*This drawing is a reproduction of
the Original on a reduced scale.*



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